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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,167	09/30/2003	Cetin Kaya	TI-24995.1	5903

23494 7590 05/04/2005

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER

TRINH, MICHAEL MANH

ART UNIT PAPER NUMBER

2822

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/675,167	KAYA ET AL.	
	Examiner	Art Unit	
	Michael Trinh	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11 and 16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

*** This office action is in response to Applicant's amendment filed on February 17, 2005.

Claims 1-10,12-15 were canceled. Claims 11 and 16 are currently pending.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

1. Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 16, original specification does not teach and support for "...forming a layer of nitride over said layer of oxide, said layer of nitride thermally grown...". Contradictorily, specification page 6, lines 18-24 differently teaches "...causing nitridation of the underlying polysilicon layer 120 by diffusion through the oxide layer 140, forming nitride layer 130..." (see present Fig 1B). Thus, original specification does not support forming a layer of nitride over said layer of oxide, said layer of nitride thermally grown.

Claim Rejections - 35 USC § 103

2. Claims 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneoka (6,344,394) taken with Kobayashi (6,489,649) and Kubo (5,840,631).

Re claim 11, Kaneoka teaches a method comprising at least the steps of: forming a first layer of silicon 14,5 at least partially overlying a body of semiconductor material 1 (Figs 2a-2c; col 4; col 2, line 55 through col 3, line 16); forming a layer of nitride 6 at least partially overlying said first layer of silicon 14,5 (Fig 2c; col 4, lines 48-51), wherein the layer 6 of nitride is thermally grown (col 2, line 55 through col 3, line 16; col 4, lines 49-51); forming a layer of oxide 15 over the layer 6 of nitride (Figs 2d-e; col 4, lines 52-60), wherein the layer 15 of the oxide is deposited by thermal CVD; after said steps of forming said layer of nitride 6 and forming said layer of oxide 15,7, forming a second layer of silicon 8 (col 4, lines 61-67; Fig 2f) at least partially overlying said layer of oxide 7,15 said layer of nitride 6, and said first layer of silicon 5,14; wherein only two layers are present between the first layer of silicon 5,14 and said

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second layer of silicon 8. Re further claim 16, insofar as understood in light of the specification, in another embodiment at Figures 3a-3f, Kaneoka also teaches forming a first layer of silicon 14,5 at least partially overlying a body of semiconductor material 1 (Figs 3a-3c; col 5; lines 21-30); forming a layer 15 of oxide at least partially overlying said first layer of silicon 14,5 (Fig 3c; col 5, lines 30-37), wherein the layer 15 of oxide is deposited by thermal CVD (Fig 3c, col 5, lines 30-37); forming a layer 6 of nitride over the first layer of silicon 5/14 (Fig 3d), wherein the layer 6 of nitride is thermally grown over the first layer of silicon (Figs 3d-e; col 5, lines 38-50; col 2, line 55 through col 3, line 16), or a thin layer of nitride is inherently formed over the layer of oxide 17,15; after said steps of forming said layer of nitride 6 and forming said layer of oxide 15,17, forming a second layer of silicon 8 (Fig 3f; col 5, line 50 through col 6) at least partially overlying said layer of oxide 17,15 said layer of nitride 6, and said first layer of silicon 5,14; wherein only two layers are present between the first layer of silicon 5,14 and said second layer of silicon 8 (Fig 3f).

Re claims 11 and 16, Kaneoka already teaches depositing the layer 15 of oxide by thermal CVD, but lacks mentioning the CVD as a LPCVD. Kaneoka also already teaches forming a first silicon layer 14 on a body of semiconductor material 1 for nonvolatile memory, but lacks mentioning the semiconductor material comprising a substantially monolithic body.

However, Kobayashi teaches (at col 2, lines 39-49; col 13, lines 35-40; Figs 13a-14d) depositing a layer 205 of oxide by LPCVD process, wherein by using the LPCVD process, it is possible to decrease leakage current of the silicon oxide film. Kubo teaches (at col 1, lines 22-30) that a silicon oxide film is formed by a thermal CVD, wherein this thermal CVD comprises an LPCVD (low pressure CVD). Additionally, Kobayashi also teaches (at col 6, lines 38-46, Figs 1,13, and 14) forming a semiconductor device by using a single-crystal silicon body 201 for the semiconductor material 201 (i.e. a substantially monolithic silicon body), wherein a first silicon layer 204 is formed on the single crystalline silicon body 201, wherein only two layers 205/213 of oxide and nitride are formed between the first silicon layer 204 and a second silicon layers 207 for the nonvolatile memory (Figs 13c through 14d; col 13, line 6 through col 14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form deposit the silicon oxide layer by thermal CVD of Kaneoka by employing the LPCVD as taught by Kobayashi and Kubo. This is because at least of the

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desirability to decrease leakage current of the silicon oxide film so that stable operations and a retention capability of a non-volatile memory device can be obtained. Moreover, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the nonvolatile memory of Kaneoka in the substantially monolithic body of semiconductor material (e.g. single crystalline silicon) as taught by Kobayashi. This is because of the desirability to form the nonvolatile memory in a bulk single crystalline silicon body as a starting material, wherein the single crystalline silicon has a uniformity of crystal structure with a high degree of crystalline perfection of single crystalline, and wherein a plurality of devices can be formed on the same single crystalline silicon body substrate.

Response to Arguments

*** Applicant's arguments filed February 17, 2005 have been fully considered but they are not persuasive, and are also moot in view of the new ground(s) of rejection.

** Applicant remarks (at remark page 8, last paragraph) about Kaneoka that "...Kaneoka et al. teaches away from the advantageously claimed invention by teaching the use of two layers of nitride (column 4 lines 18-20, column 5 lines 5-7, column 6 lines 49-56, column 7 line 1); not a single layer of nitride as advantageously claimed".

In response, this is noted and found unconvincing. Applicant appears to misread the teachings of Kaneoka. Kaneoka teaches "the dielectric film between the control and floating gate electrodes for data detention is formed by two layers of the silicon nitride film 6 and the silicon oxide film 7". The first layer of two layers is the silicon nitride film 6. The second layer of the two layers is the silicon oxide film 7.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F from 8:30 Am to 4:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs-7

A handwritten signature in black ink, appearing to read "Michael Trinh", is positioned above the printed name and title.

Michael Trinh
Primary Examiner